# User Manual

# Vibration Analyser
# Adash 4300 - VA3
## Cross Channel

FW 03.07 BETA

*Ref: 18022005 RS*

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# ***Before Switching On the Analyser***

**Ignoring any recommendations mentioned below may cause failure of the instrument.**
**Operating with a power higher then 24 V can cause an accident.**

**1. Connect into the ICP input only:**
- **ICP powered sensor**
- **AC voltage max. 12 V peak-peak**
- **DC voltage max. +/- 24 V.**

**If you are not sure, contact your dealer or directly our website.**

**2. Never connect the analyser to a line voltage 230 V (110 V).**

**3. Only use batteries with a nominal voltage of max. 1.5 V.**

**Warning!**
**Be careful of battery orientation!**

## *Indication of Weak Batteries (re-chargeable)*

When you select the ***Instrument info*** from main menu, then information on the current condition of the batteries appears.
While the instrument is switched on, the battery condition is checked every 30 sec.

1. When a ***warning*** low battery level is detected (insufficient to enable correct and safe work with instrument), the yellow ERR light is on (on the top of keyboard). Finish your current measurement and then change the batteries.
2. When the ***alert*** low battery level is detected, all three lights on the top of the keyboard blink three times and instrument switches itself off. You have to change the batteries immediately. If the instrument switches itself off after switch-on, then you also have to change the batteries immediately.

**Attention!**
When the instrument is switched off for several minutes, weak batteries can be regenerated and for a limited time can seem to be in good condition. Do not try repeatedly switching on, when the instrument itself switches off immediately! You may cause instrument failure and data in memory can be corrupted.


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# ***References***

This user manual contains information on how to operate with FW module Cross Channel Analyser. It contains detailed description about this FW module.

References:
***[1] Vibration Analyser Adash 4300-VA3, User manual***
The basic manual is often mentioned in this one as ***see [1]***.

We recommend reading of introductory chapters ***References*** and ***Terminology*** in the basic user manual [1] at first.
This manual is registered in the list of references as the [6] item.


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# ***Cross Channel Analyser Description***

The Cross Analyser firmware offers two channel measurements with synchronised sampling in both channels. Such measurements we divide to three main groups:

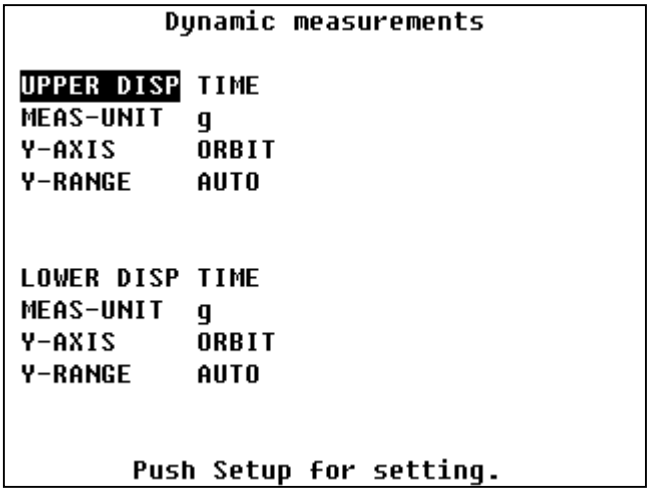
- time signal measurements on two channels with orbit graph (very efficient tool for evaluation of signal from two non-contact displacement sensors),
- amplitude spectrum measurements (useful to take the absolute magnitudes of the measured signals from the both channels)
- cross channel functions as frequency response, coherence, ... .

These measurements are covered in ***Main menu -> Analyser -> Dynamic measurements*** item. This item supports only synchronised two channel measurements, for single channel measurements the Data Collector firmware has to be used.

## *Two channel time signal measurement*

This function enables synchronised time signal measurement on two channels. Several displays of the results are possible:
- orbit graph,
- two time signals from two channels in one display,
- individual time signal from one channel.

The button ***Info*** works as the switch between all display modes.




### UPPER DISP and LOWER DISP parameters

Set both parameters to ***TIME*** . The setting in one display is automatically copied to the second one.

### MEAS-UNIT parameter

Set the unit, in which the measurement will be displayed. The selection depends of the sensor, which is used for measurement. The setting in one display is automatically copied to the second one.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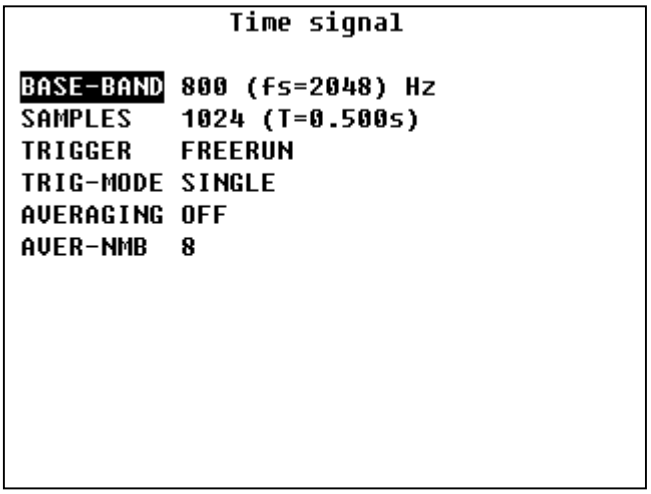
## Y-AXIS parameter

Set, what graph will be displayed first. The setting in one display is automatically copied to the second one. Possible choices are ***ORBIT*** or ***REAL***. The button ***Info*** works as the switch between all display modes.

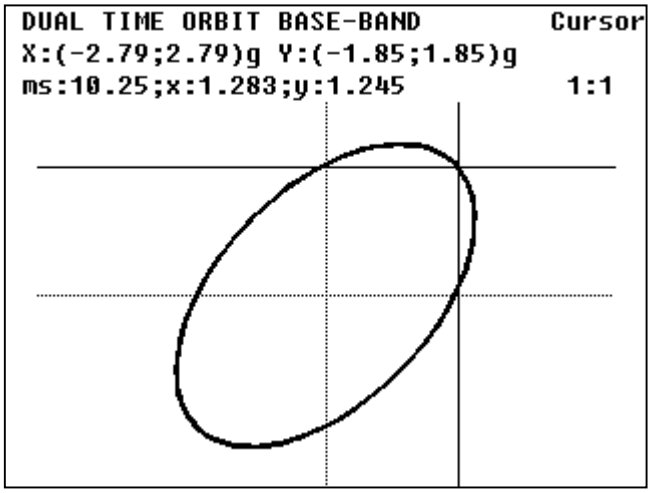
## Y-RANGE parameter

Set required range for y-axis. ***AUTO*** is the usual choice.

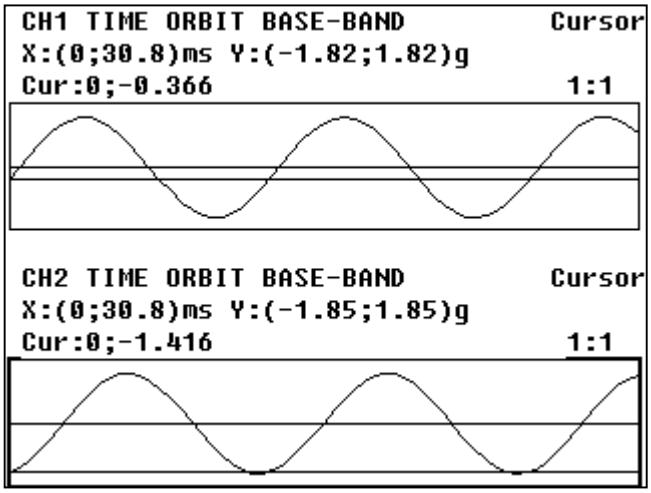
Now the measurement display is set. Push the ***Setup*** button, the next setup screen appears.




This screen is the standard setup screen for dynamic measurements ( ***Dyn. Measur. – Setup menu – > Time Signal Item***), see the ***[1],*** for detailed description. Return back to Dynamic measurement screen by pressing ***ESC*** . Run the measurement by pressing ***START***. The result graph will have two forms.




Y-AXIS = ORBIT




Y-AXIS = REAL

The button ***Info*** works as the switch between all display modes.



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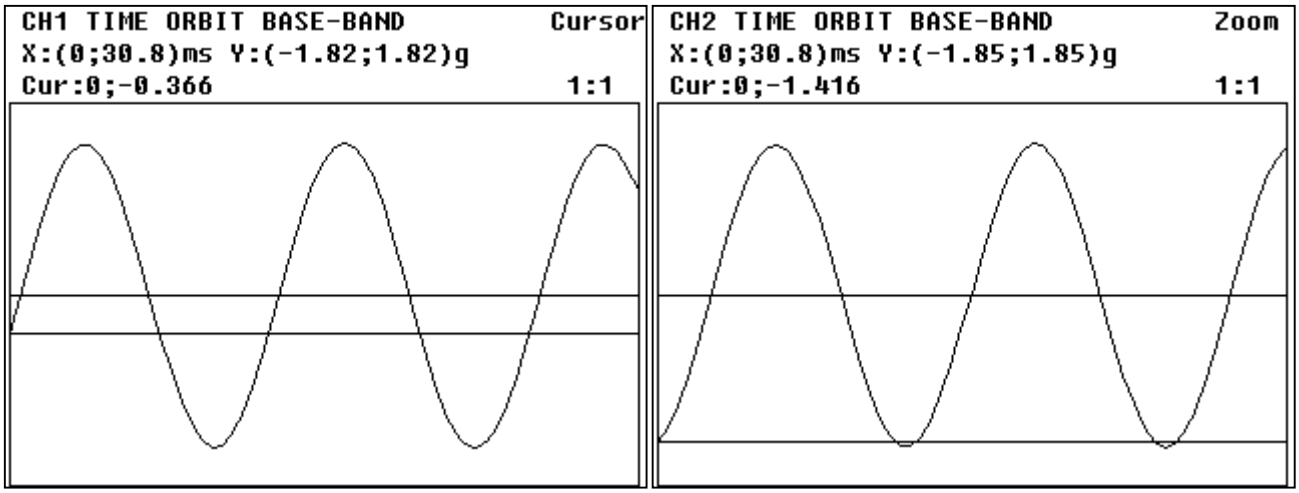
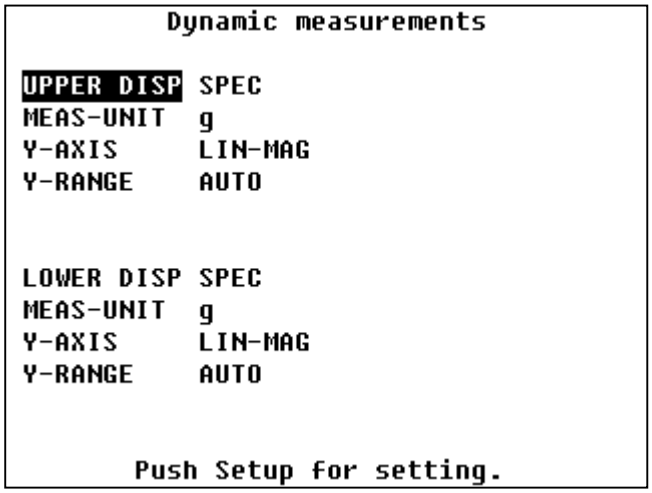



Individual graphs for each channel.

## *Two channel amplitude spectrum measurement*

This function enables synchronised amplitude spectrum measurement on two channels. Several displays of the results are possible:
- two magnitude graphs from two channels in one display,
- individual magnitude graph from one channel.

The button ***Info*** works as the switch between all display modes.




### UPPER DISP and LOWER DISP parameters

Set both parameters to ***SPEC***. The setting in one display is automatically copied to the second one.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## MEAS-UNIT parameter

Set the unit, in which the measurement will be displayed. The selection depends of the sensor, which is used for measurement. The setting in one display is automatically copied to the second one.

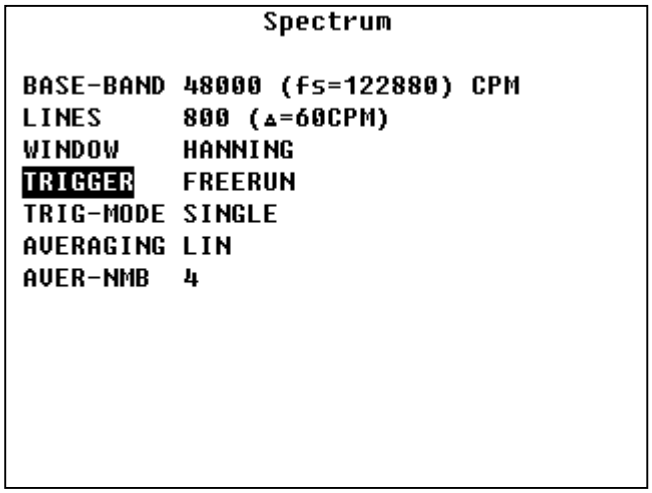
## Y-AXIS parameter

***LIN-MAG*** has to be set

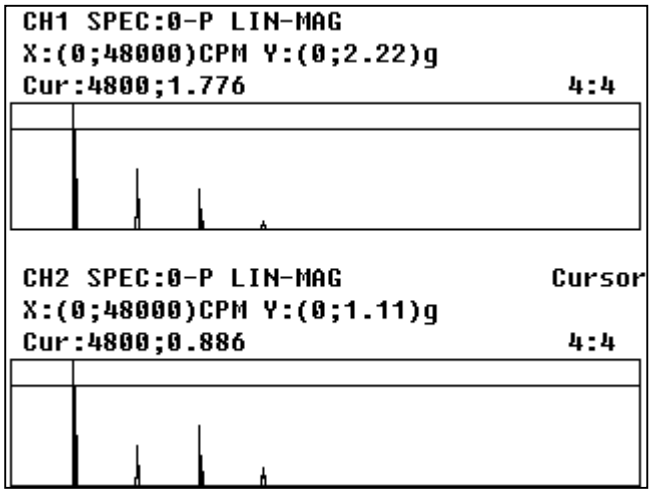
## Y-RANGE parameter

Set required range for y-axis. ***AUTO*** is the usual choice.

Now the measurement display is set. Push the ***Setup*** button, the next setup screen appears.




This screen is the standard setup screen for dynamic measurements ( ***Dyn. Measur. – Setup menu – > Spectrum Item***), see the ***[1],*** for detailed description. Return back to Dynamic measurement screen by pressing ***ESC*** . Run the measurement by pressing ***START***. The result graph will have two forms.




Both magnitudes



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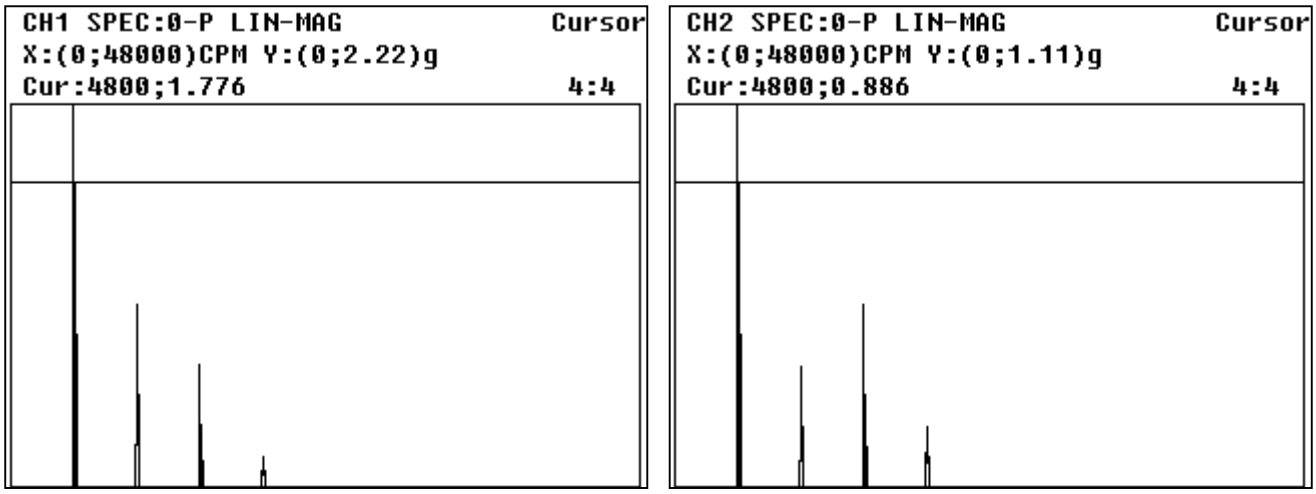
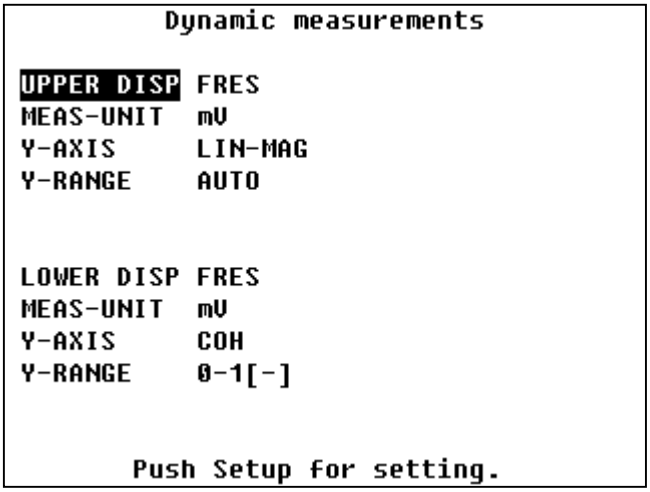



Individual graphs for each channel.

## *Frequency response functions*

Frequency response function is the transfer function between the two channels. This transfer function is evaluated for every frequency in the selected frequency range.

We can use simple example:
The electronics board has one input and one output. We do not know, what it is inside. We look at it as to black box. From a signal generator we produce a signal e.g. freq.=80 Hz and amplitude=100mV. This signal we connect to the input of our black box. When we measure the signal at the output, then there is on 80Hz e.g. 500mV. It means, that the transfer rate is 5. If we then look to the phase, then e.g. the signal on the output is delayed by 90 degrees. Now we together know the frequency response function values on 80Hz ( MAG=5 and PHASE=-90degrees). Frequency response function contains this information for all frequencies in its range. The next question is how are response values stable on each frequency? The COHERENCE function shows this information. The value range of COHERENCE is from 0 to 1. When the value is equal 0, there is no stable relation between input and output. When the value=1 it means that there is a very strong relation between them. The value between 0 and 1 is the statistical evaluation of transfer relation. When we want to declare some relation between input and output, then we need the coherence value to be very close to 1. Because the coherence function is evaluated by statistical process, averaging has to be used. When only one frequency response measurement is made, then coherence is equal 1 in whole range.



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Set the both Dynamic measurement screens to FRES (frequency response function). The Dynamic measurement screen is used to set the upper display to LIN-MAG (linear scale) or LOG-MAG (logarithmic scale) and the lower display to COH (Coherence) or PHASE. The button ***Info*** works as the switch between all display modes.

## UPPER DISP and LOWER DISP parameters

Set the FRES for frequency response measurement.

## MEAS-UNIT parameter

Set the unit, in which the measurement will be made. The selection depends of the sensor, which is used for measurement. The setting in one display is automatically copied to the second one.

## Y-AXIS parameter

The Y-AXIS of freq. response magnitude we can set as LIN-MAG (linear scale) or LOG-MAG (logarithmic scale). The lower display we can set to COH (Coherence) or PHASE. The button ***Info*** works as the switch between display modes, it creates the next menu window in which we can defined required display mode.

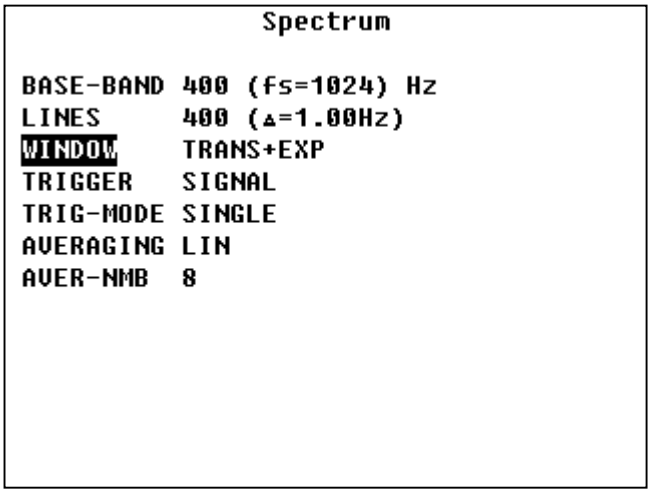
The unit for displayed graph is automatically set to:

| | |
|---|---|
| [-] | for LIN-MAG |
| [dB] | for LOG-MAG |
| [deg] | for PHASE |
| [-] | for COH. |

## Y-RANGE parameter

Set required range for y-axis. ***AUTO*** is the usual choice.

Now the measurement display is set. Push the ***Setup*** button, the next setup screen appears.




This is the standard setup screen for Spectrum measurement, which contains the same parameters as we need to define for frequency response function. See detailed description in ***[1]***, ***Menu Dyn. Measur. – Setup menu –> Spectrum Item*** chapter. The new feature of this screen is the possibility to define several FFT window types.
When we want to measure transient events, then we have to use TRIGGER=SIGNAL and WINDOW=TRANS+EXP.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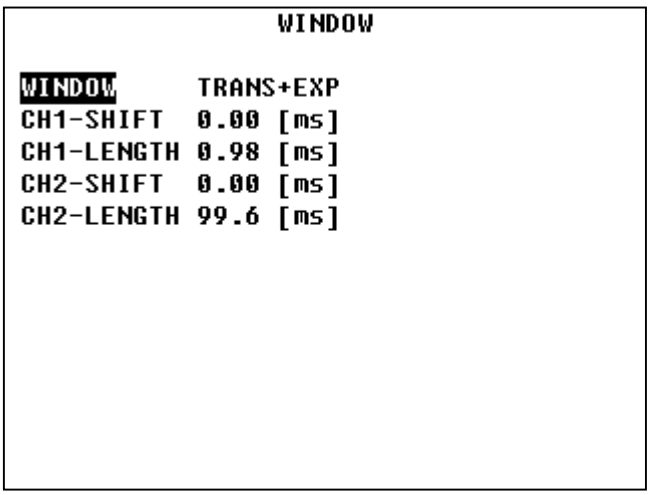
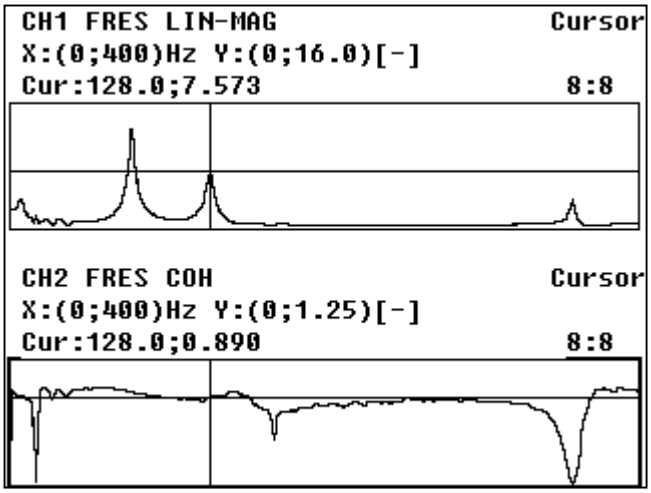
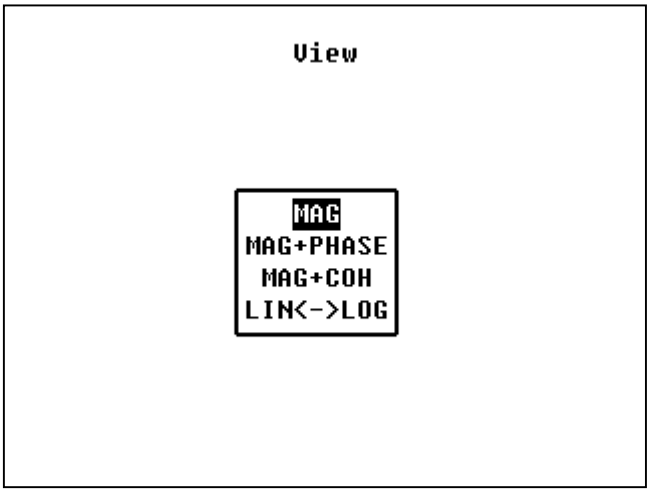



Return back to Dynamic measurement screen by pressing ***ESC*** . Run the measurement by pressing ***START***. The next pictures show several of the possible plots which are presented.




LIN-MAG freq. response and Coherence

Press ***Info*** for next menu for another graphs choices.





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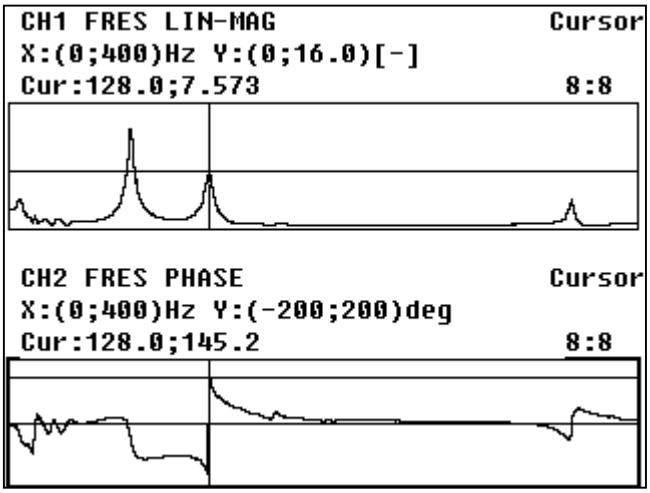
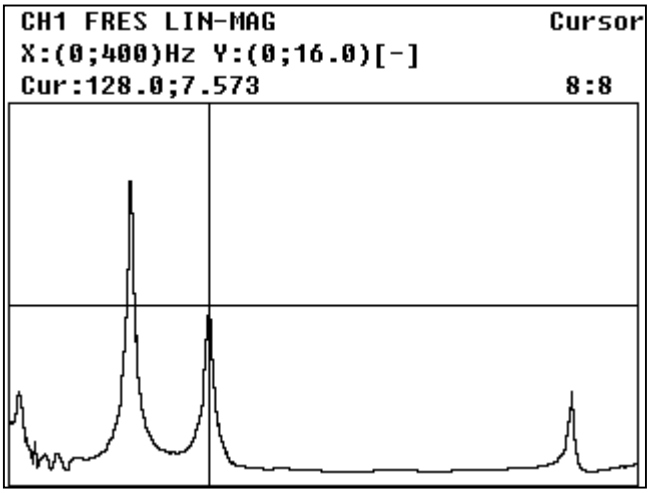



LIN-MAG freq. response and Phase




LIN-MAG freq. response only

## How to precisely set transient and exponential FFT window?

1. Set the FRES, set the TRANS+EXP window and roughly set their parameters (shifts+lengths).

2. Now set the TIME instead FRES and Y-AXIS=REAL – two channel time signals.

3. Take the measurement.

4. Press ***Info*** and display time signal from channel 1. Press ***Setup*** button and TRANSIENT window appears.

5. Set the cursor to the position, where the transient window should begin. Push ***Cursor*** button and the window moves to this position. Set the cursor to the position, where the transient window should end. Push ***Shift Cursor*** buttons and the window end moves to this position. In this way both window parameters are precisely set. Press ***Setup*** button several times. The transient window drawing is switched off and on again. You can perfectly look, whether the window is in the required position.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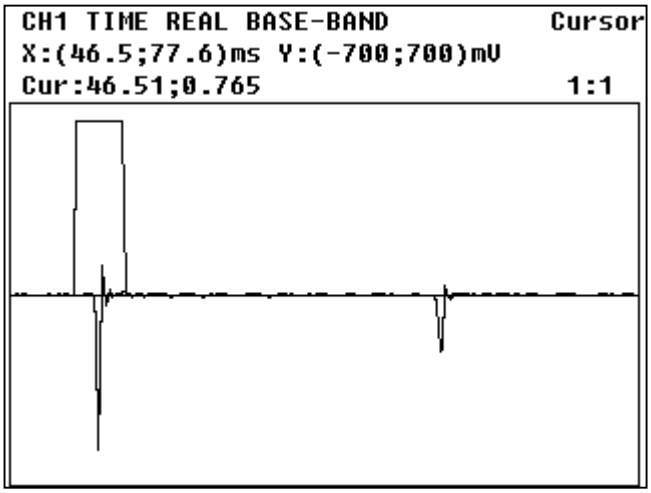
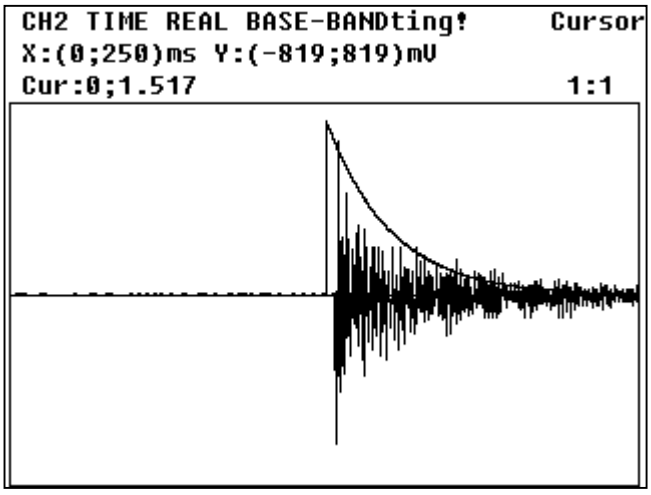



Transient event in time signal and transient window

6. Press ***Info*** and display time signal from channel 2. Press ***Setup*** button and EXPONENTIAL window appears.

7. Set the cursor to the position, where the exponential window should begin. Push ***Cursor*** button and the window moves to this position. Shift the cursor to the right. Push ***Shift Cursor*** buttons and the window shape will change. By moving cursor to the left or right tune the required shape of exponential window. Pay attention, the exponential window has to lay to the X-axis ahead of the end of signal. In this way both window parameters are again precisely set. Press ***Setup*** button several times. The exponential window drawing is switched off and on. You can again perfectly look, whether the window is in required position.




Transient event in time signal and exponential window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# ***User notes***


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